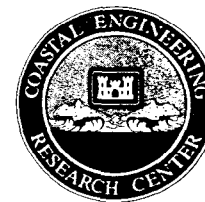# Coastal Engineering Technical Note

COMPUTER PROGRAM: BERM

PURPOSE: The BEach Profile Re-Molder (BERM) program is a PC based program to graphically edit profile survey data on the monitor. The program has two main applications: 1) to build beach fill templates on the existing (condition) profile and compute design volumes, and 2) as a general purpose profile survey editor.

BACKGROUND INFORMATION: Beach fill projects provide storm protection to upland structures through construction and maintenance of an enhanced berm and dune system. The cross-sectional geometry of the berm and dune configuration is called the design profile or design template. Beach fill design profile alternatives are evaluated using a cross-shore sediment transport model such as SBEACH (Larson and Kraus 1989) to determine the optimum profile cross-section. Each design alternative to be modeled requires placement of a specific quantity of material or geometric configuration on the condition profile. It is difficult to digitally create the desired alternative with conventional software. The Interactive Survey Reduction Program (ISRP) (Birkemeier 1984) can be used for this purpose, however, it requires several iterations to achieve the desired design. BERM was developed to provide the designer with a graphical editor to create a design profile by manipulating individual profile data points through the use of a pointing device. Individual survey points can be: a) moved, b) deleted, and c) inserted. Once the desired design profile has been created, the volumetric option can be used to determine the quantity of material (per linear ft (m)) required for the design.

The second major use of the BERM program is to graphically edit profile survey data. Raw survey data often contain erroneous points which need to be deleted or moved. The BERM program provides a user friendly, on-screen tool to quickly correct raw data.

DESCRIPTION OF PROGRAM: BERM runs on an IBM compatible personal computer (PC) with at least 380 kilobytes (K) of free memory, a VGA graphics adapter and monitor with 640x480 resolution, and either a hard disk (preferable) or two floppy disk drives.

Input data for the BERM program are profile survey data in the form of distance from a baseline (Y) and elevation (Z). ISRP-2d and ISRP-3d are the two formats which are presently supported (Birkemeier 1984). Each profile survey can have a maximum of 400 Y-Z pairs. The program is structured to load one survey into memory at a time, therefore, the number of surveys to be edited during one session is limited only by the capacity of the storage medium.

A parameter file which must be named BERM.PRM and located in the working directory is used to set internal variables required for program execution. The parameter file must adhere to the format described in Table 1. This file can be edited with an ASCII file editor to change any parameter(s).

Table 1.

Format of BERM.PRM Parameter File

Record	Entry Description
1	Title
2	ISRP Format (ISRP2) or (ISRP3)
3	Profile Reference Datum
4	Volumetric and Shoreline Change Reference Datum, Datum Adjustment relative to the Profile Reference Datum
5	Units (Ft) or (M)
6	Minimum Y coordinate
7	Maximum Y coordinate
8	Y Label Increment
9	Minimum X coordinate
10	Maximum X coordinate
11	X Label Increment

PROGRAM EXECUTION: The opening window prompts the user for both INPUT and OUTPUT data files. In this manner, the original INPUT data file is kept unaltered with the OUTPUT file containing the edited data. After entering the data file information, the user is prompted for which survey to be edited with the correct response of Yes, No or Quit. Entering a Y will plot the profile on the monitor. The four arrow keys (UP, DOWN, LEFT, RIGHT) move an arrow-

shaped pointer. The distance the pointer moves for every keystroke may be increased or decreased using the ± or - keys. To move a survey point, locate the tip of the pointer on or near the survey point and press M. The user must confirm the response with either a Y or N. The four arrow keys (UP, DOWN, LEFT, RIGHT) will move the survey point to the desired position. A carriage return CR terminates the move operation. A point may be inserted at the pointer location by pressing the I key. Likewise a point may be deleted by locating the pointer on or near the survey point and pressing D. The user can position the pointer on a specific point by pressing G and entering the point number, i.e. a 5 would locate the pointer at the fifth survey point. The graph may be zoomed-in by pressing Z. A zoom box will appear with one corner anchored at the current pointer location. The four arrow keys (UP, DOWN, LEFT, RIGHT) will move the opposite corner of the zoom box. A CR terminates the zoom operation. The graph may be un-zoomed to the original size by pressing U. A Quit will abort any changes made during the editing process and re-display the unaltered profile, while an End will terminate editing, save the data, and return to the previous window to prompt the user for editing additional surveys.

Volumetric Calculations:

All volumetric and shoreline change calculations are computed relative to the "Volumetric and Shoreline Change Reference" datum as specified in the BERM.PRM file, i.e. MSL, MHW. In this manner, the profile data can be referenced to a common vertical survey datum such as NGVD, while volumetric and shoreline change calculations are reference to a datum with more significant physical meaning such as MHW.

Pressing a V will compute the volumetric difference between the original (un-altered) and edited profile. The volumetric difference is needed in beach fill design work to determine the berm volume per linear unit of beach. Computationly, the volume routine linearly digitizes each profile (original and edited) on a 1 ft (0.3048 m) interval and computes the volumetric difference based upon the average end method. Volumetric changes are computed in terms of cut (erosion) and fill (accretion) cell quantities. The following cell parameters are computed (Birkemeier 1984):

a. Distance to the end. The linear distance from the baseline to the seaward end of each cell.

b. Elevation to the end. The elevation at the seaward end of each cell.

c. Cell volume. The volume of the cell.

d. Profile cumulative volume. The sum of all preceding cells or the "net volume change."

In addition, the volume change above and below datum and total (above + below) is computed. The intersection of the datum with the profile, referred to as the shoreline, is computed for both profiles along with the difference in linear change between the shorelines.

AVAILABILITY: BERM may be obtained from Mr. Mark Hansen (601) 634-3007 of the US Army Engineer Waterways Experiment Coastal Engineering Research Center, Vicksburg, MS. For additional guidance in applying BERM, please contact Mr. Mark Hansen at (601) 634-3007.

REFERENCES:

Birkemeier, W. 1984. "A User's Guide to ISRP: The Interactive Survey Reduction Program," Technical Report CERC-84-1, US Army Engineer Waterways Experiment Station Coastal Engineering Research Center, Vicksburg, MS.

Larson, M. and N.C. Kraus, 1989. "SBEACH: Numerical Model for Simulating Storm-Induced Beach Change," Report 1, Empirical Foundation and Model Development, Technical Report CERC-89-9, US Army Engineer Waterways Experiment Station, Coastal Engineering Research Center, Vicksburg, MS.